

REMARKS

This Response is submitted in reply to the Office Action dated December 24, 2008, in which the Examiner:

rejected claims 1-5 and 17-21 under 35 USC § 103(a) as being unpatentable over US Patent No. 5,840,347 to Muramatsu et al. (Muramatsu) in view of US Patent No. 4,521,172 to Gilbert and in further view of US Patent No. 6,352,662 to Murphy et al. (Murphy).

As an initial matter, Applicants note that on April 6, 2009, Attorney for Applicant, Michael Cartona, and Examiner Matthew Daniels participated in a telephonic interview for the purpose of attempting to resolve outstanding issues in the Application. Among the references discussed were Muramatsu (5,840,347) and Gilbert (4,521,172). Attorney for Applicant argued that Fig. 8 of Muramatsu relied upon by the Examiner in his rejection was merely a schematic/simplified drawing used to illustrate steps in a process. The Examiner noted that Muramatsu did not appear to describe Fig. 8 as a schematic view and indicated that such arguments would likely not be persuasive in overcoming the outstanding rejection. The Examiner also pointed to Gilbert to establish a level of knowledge in the art that one would open mold halves to allow removal of volatiles. The Examiner further pointed to page 15, lines 1-3 and page 15, lines 9-11 of the specification and suggested that if the independent claims included the features recited by these portion of the specification, he would be inclined to withdraw the previous rejections.

With respect to the outstanding Office Action, the rejection noted above is respectfully traversed as follows. Claims 17-21 are pending, of which claim 17 is the only independent claim. Claims 1-5 have been canceled by the present amendment and claims 6-16 have been previously withdrawn.

To establish a *prima facie* case of obviousness for a claimed invention, all the claim limitations must be taught or suggested by the prior art. M.P.E.P. § 2143.03. Applicants respectfully submit that the Examiner has not established a *prima facie*

case of obviousness because the combination of Muramatsu, Gilbert and Murphy do not teach or suggest each recitation of independent claim 17.

In particular, Applicants respectfully submit that the combination of Muramatsu, Gilbert and Murphy do not teach or suggest a method including inserting a composite body including an internal-pressure holding tube and a prepreg *into a vacuum chamber containing a forming die, evacuating the vacuum chamber in an isolation state where the composite body and the forming die do not contact each other, so that air having existed in a space between an outer periphery of said composite body and a periphery of said forming die is removed*, and clamping the forming die after completion of the evacuating step, *while maintaining said evacuation state, where air having existed in a space between said outer periphery of said composite body and said periphery of said forming die has been removed*, as recited in independent claim 17.

The Examiner has alleged that Muramatsu teaches a process for forming a hollow FRP article by internal pressure molding including positioning a FRP prepreg on a periphery of an internal-pressure holding tube, inserting a composite body including the internal-pressure holding tube into a forming die, providing an isolation state where the composite body and forming die do not contact each other, and clamping the forming die to bring the composite body into contact with each other and heating the forming die. The Examiner has correctly noted that Muramatsu is silent as to (1) the vacuum chamber and evacuating during the isolation state, and (2) an application of pressure to an inside of the internal pressure holding tube, however, the Examiner alleges that these aspects of the invention would have been obvious over Gilbert and Murphy.

The Examiner has relied on Fig. 8, items 26 and 28 of Muramatsu as disclosing “an isolation state where the composite body and forming die do not contact each other.” Contrary to the Examiner’s allegation, however, Applicants respectfully submit that neither Muramatsu, nor any of the cited prior art

references, discloses *evacuating the vacuum chamber in an isolation state where the composite body and the forming die do not contact each other*, as explicitly recited in independent claim 17.

Muramatsu teaches a known apparatus and method for producing a cylindrical product of a fiber reinforcement-thermoplastic resin composite. As will be readily appreciated from a review of Muramatsu, Muramatsu is directed to a process and an apparatus “for winding a fiber reinforcement-thermoplastic resin composite sheet” on a mandrel to produce a cylindrical intermediate for use in molding a fiber reinforced thermoplastic resin pipe. (Muramatsu, Col. 4, lines 35-56).

Applicants draw the Examiner’s attention to the description of Fig. 8 under the “BRIEF DESCRIPTION OF THE DRAWINGS,” which reads, “FIG. 8 is sectional views showing steps of a process for producing a fiber reinforced thermoplastic resin pipe from a cylindrical intermediate in accordance with this invention.” (Emphasis added; Muramatsu, Col. 4, lines 65-67). Accordingly, Applicants respectfully submit that FIG. 8 of Muramatsu is merely a schematic view showing the steps of a process for forming a fiber reinforced thermoplastic resin pipe from a cylindrical intermediate, and is not intended to show each feature of the invention. That is, while it appears that Fig. 8, items 26 and 28 show a cylindrical intermediate 26 in a mold 28 where the cylindrical intermediate and the mold do not contact each other, Applicants respectfully submit that this portion of Fig. 8 merely shows the step of molding the cylindrical intermediate for illustrative purposes only.

Indeed, the upper-most portion of Fig. 8 shows the steps of wrapping a composite sheet 23 on a mandrel 13 to form a composite intermediate 26 and removing the mandrel 13 once the wrapping is completed. Applicants respectfully submit that the overwhelming majority of the disclosure of Muramatsu describes and enables these steps as shown in the upper-most portions of Fig. 8. That is, almost the entire written description, at least columns 5-9 of Muramatsu, discloses

exactly how the composite sheet 23 is wrapped on the mandrel 13, and discloses the apparatus that accomplishes the wrapping of the composite sheet 23 on the mandrel.

With respect to the portion of Fig. 8 that allegedly discloses a cylindrical intermediate 26 in a mold 28 where the cylindrical intermediate and the mold do not contact each other, Applicants respectfully submit that this portion is merely included in Fig. 8 to show that the cylindrical intermediate formed by the apparatus and process of Muramatsu may then be placed in a mold and molded by known methods to obtain a fiber-reinforced thermoplastic resin pipe. As will be readily appreciated from a review of Muramatsu, a comparatively minuscule portion of the disclosure, Col. 10, lines 4-27, is directed to the step of molding the cylindrical intermediate to obtain a fiber-reinforced thermoplastic resin pipe. Indeed, Muramatsu only generally mentions that "any molding technique used in ordinary pipe molding may be employed without particular limitation" such as "the internal-pressure molding method and the external pressure molding method." Regarding the actual molding step however, Muramatsu merely states that the "cylindrical intermediate 26 with expandable substance 27 is placed in a mold 28, and is heated while being pressed internally to thereby mold pipe 30." (Muramatsu, Col. 10, lines 24-27).

As will be readily appreciated, and in contrast to the wrapping step shown in the upper portion of Fig. 8, Muramatsu is absolutely silent on the particular way the cylindrical intermediate is supported within the mold. From a review of Fig. 8, it appears that the cylindrical intermediate is "floating" within the mold, i.e., there is nothing to show or describe exactly how the cylindrical intermediate is held or supported. Accordingly, one of ordinary skill in the art will readily appreciate that the cylindrical intermediate must be supported within the mold by some means, however, this means is not shown in any of the figures or described in any part of the specification of Muramatsu.

Indeed, as will be readily appreciated by one of ordinary skill in the art, at the time of the invention of Muramatsu it was not known to support the cylindrical

intermediate in such a manner so that the cylindrical intermediate and the mold did not contact each other. As such, Applicants further submit that not one line of Muramatsu is dedicated to disclosing exactly how the cylindrical intermediate is supported within the forming die. Given this lack of supporting disclosure, Applicants respectfully submit that Fig. 8 of Muramatsu is merely a schematic view illustrative of the steps of a process for forming a fiber reinforced-thermoplastic resin pipe, and is in no way intended to show an actual view of a wrapping apparatus or molding machine. Muramatsu cannot, therefore, be relied upon for teaching the placing a composite body in a forming die where the composite body and forming die do not contact each other, absent some express teaching of how the composite body is actually supported.

In view of this complete lack of supporting disclosure for the molding step illustrated in Fig. 8, Applicants respectfully submit that the Examiner's allegation that Fig. 8 of Muramatsu discloses, "providing an isolation state where the composite body and forming die do not contact each other," is in error. In addition, Applicants have reviewed the other prior art of record, including Gilbert and Murphy, and can find no disclosure regarding this feature. Accordingly, Applicants respectfully submit that since neither Muramatsu, nor any of the other cited prior art references, either alone in combination, discloses a method including inserting a composite body including an internal-pressure holding tube and a prepreg into a vacuum chamber containing a forming die and evacuating the vacuum chamber in an isolation state where the composite body and the forming die do not contact each other, so that air having existed in a space between an outer periphery of said composite body and a periphery of said forming die is removed, the instant rejection of claim 17 is improper and should be withdrawn.

Notwithstanding the above, Applicants believe that the present invention is allowable over the cited references for additional reasons. As stated above, the Examiner has correctly noted that Muramatsu is silent as to (1) the vacuum chamber and evacuating during the isolation state. The Examiner therefore relies on Gilbert as teaching this missing feature. In particular, the Examiner has asserted that Gilbert teaches a vacuum press having molding halves in which it is possible to

apply a vacuum and open the molding tool by separating the platens with the ram so as to allow volatiles and air to be removed before compression molding and that it would have been obvious to incorporate the method of Gilbert into that of Muramatsu because Gilbert's process provides an improvement in the art by its ability to remove air, trapped gases and volatiles from a resin through the use of a vacuum pumping process prior to molding, and that one of ordinary skill in the art would have expected the removal of air and volatiles to reduce the number and size of voids or bubbles in the formed article.

Gilbert teaches a known moulding machine with door means which are operable to define with external frame members of the machine a closed, air-tight chamber enclosing the moulding area of the machine. Applicants respectfully submit that Gilbert is an improper reference under 35 U.S.C. § 103(a) because it is non-analogous art. As will be appreciated, the vacuum chamber of Gilbert is intended to be used with compression and injection moulding machines (Col. 1, lines 8-9). That is, Gilbert is directed to an *injection moulding machine* or a *compression moulding press* fitted with a vacuum box (Col. 2, lines 8-13). In stark contrast, the present application is directed to a method for forming a hollow FRP article by internal pressure molding. As such, Applicants respectfully submit that one skilled in the art of internal pressure molding would not look to the compression and injection molding arts to solve the problem of air bubbles being trapped between the composite weave and the forming die, as is contemplated by the present invention. That is, such a combination of Muramatsu, Gilbert and Murphy would not have been obvious at the time of the invention. As Gilbert should not be relied upon to teach a vacuum chamber and evacuating the chamber in an isolation state, and as none of the other cited references disclose this feature, Applicants respectfully submit that the instant rejection is improper and should be withdrawn for at least this reason.

Applicants earnestly believe that independent claim 17 is allowable over the cited prior art, either alone or in combination for at least one additional reason. Applicants respectfully submit that even if inserting a composite body including an internal-pressure holding tube and a prepreg into a vacuum chamber containing a

forming die is generally known, evacuating the vacuum chamber is generally known, and clamping the forming die after completion of the evacuating step is generally known, independent claim 17 does not merely and generally recite such steps. To the contrary, independent claim 17 specifically recites inserting a composite body into a vacuum chamber containing a forming die, evacuating the vacuum chamber in an isolation state where the composite body and forming die do not contact each other, and clamping the forming die to bring the forming die and the composite body into contact with each other. That is, the present invention contemplates performing these steps in a specific order and at a particular time, as explicitly recited in claim 17. Accordingly, Applicants have reviewed the prior art and can find no teaching or suggestion in the prior art to perform these particular steps in this particular order, and as such, earnestly believe that the present invention is non-obvious.

As one of ordinary skill would not have combined Muramatsu with Gilbert and further with Murphy, and as these references do not teach or suggest each and every element of independent claim 17, Applicants respectfully request the allowance of claim 17 for at least the reasons stated above. Furthermore, claims 18-21 depend from claim 17 and include additional recitations. Applicants respectfully request allowance of claims 18-21 for at least the reasons stated above in connection with claim 17.

As a final matter, Applicants note that the corresponding Japanese Patent Application has recently been granted with substantially similar claims.

CONCLUSION

In view of the remarks above, it is respectfully submitted that claims 17-21 are now allowable, and an early action to that effect is earnestly solicited.

The Examiner is invited to contact the undersigned at the number below to expedite resolution of any issues the Examiner may consider to remain unresolved. In particular, should a Notice of Allowance not be forthcoming, the Examiner is requested to phone the undersigned for a telephonic interview, an Examiner's amendment, or the like, while the outstanding issues are fresh in the mind of the Examiner.

Authorization is hereby given to charge our deposit Account No. 13-0235 for the fee for the one-month extension of time, and the fees for excess claims. It is believed that no fees or deficiencies in fees are owed. However, authorization is hereby given to charge our Deposit Account No. 13-0235 in the event any fees are owed.

Respectfully submitted,

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